DOCUMENT RESUME

ED 130 901 SE 021 643

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TITLE Guess Who's Been Here for Dinner? [Aids to Individualize the Teaching of Science, Mini-Course Units for Grades 7, 8, and 9.]
INSTITUTION Frederick County Board of Education, Md.
PUB DATE 73
NOTE 13p.; For related Mini-Course Units, see SE 021 624-656
AVAILABLE FROM Frederick County Board of Education, 115 East Church St., Frederick, MD 21701 (no price quoted)

EDRS PRICE MF-$0.83 HC-$1.67 Plus Postage.
DESCRIPTORS *Biology; Individualized Instruction; Instructional Materials; Junior High School Students; *Microbiology; *Science Education; Science Materials; Secondary Education; *Secondary School Science
IDENTIFIERS Maryland (Frederick County); Minicourses; *Parasitology

ABSTRACT

This booklet, one of a series developed by the Frederick County Board of Education, Frederick, Maryland, provides an instruction module for an individualized or flexible approach to 7th, 8th, and 9th grade science teaching. Subjects and activities in this series of booklets are designed to supplement a basic curriculum or to form a total curriculum, and relate to practical process oriented science instruction rather than theory or module building. Included in each booklet is a student section with an introduction, performance objectives, and science activities which can be performed individually or as a class, and a teacher section containing notes on the science activities, resource lists, and references. This booklet introduces the student to an investigation of parasites in earthworms. The estimated time for completing the activities in this module is two days. (SL)

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MINI-COURSE UNITS

BOARD OF EDUCATION OF FREDERICK COUNTY

1973

SE 021 643

Frederick County Board of Education

Mini Courses for

Life, Earth, and Physical Sciences

Grades 7, 8, and 9

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Frederick, Maryland

1973

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FOREWORD

The contents represented in these modules of instruction, called mini courses, is an indication of our sincere desire to provide a more individualized and flexible approach to the teaching of science.

Data was accumulated during the school year relative to topics in life, earth, and physical science that were felt to be of greatest benefit to students. The final selection of topics for the development of these courses during the workshop was made from this information.

It is my hope that these short courses will be a vital aid in providing a more interesting and relevant science program for all middle and junior high school students.

Dr. Alfred Thackston, Jr.
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ACKNOWLEDGEMENTS

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GUESS WHO'S BEEN HERE FOR DINNER?

Prepared by

Paul L. Cook

CONTENTS

Student Section (white pages)

- Introduction
- Behavioral Objectives
- Activities
- Questions

Teacher Section (blue pages)

- Notes on Activities
- Materials
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Estimated Teaching Time

2 days

GUESS WHO'S BEEN HERE FOR DINNER?

INTRODUCTION:

How would you like to eat an earthworm on a dare or bet? If you did, you would receive a bonus! There is nothing alive or dead which doesn't have something living with it. Even if an astronaut went to the moon by himself, he would not really be alone, because within every living thing there is unseen company. Sometimes this "company" is important in maintaining the life of the organism in which it is living. Other times this "company" is not desirable because of its bad effects on the body. If the "company" is dangerous, it is called a parasite; the organism that is providing the home and food is the host.

There are at least two parasites found in the earthworm. One is a protozoan that reproduces sexually forming a spore case. This parasite is found in the earthworm's seminal vesicles which produce sperm. The other parasite is found in the earthworm's kidney (nephridium) and is a roundworm (nematode) that looks like a tiny squirming snake.

Both of these parasites are found only in a living earthworm. When the earthworm dies, the parasite either dies, too, or goes into a protective, dormant stage. Therefore, in using a living, wiggling earthworm, it must be numbed to make dissection easier.

BEHAVIORAL OBJECTIVES:

The student will demonstrate the presence of parasitic organisms in a living earthworm.

ACTIVITIES:

1. Place a live earthworm in a culture bowl of 5% alcohol for 3-5 minutes until most movement stops.

2. Place the earthworm in a dissecting pan with its bottom (ventral) side down. Pin the head of the earthworm down.

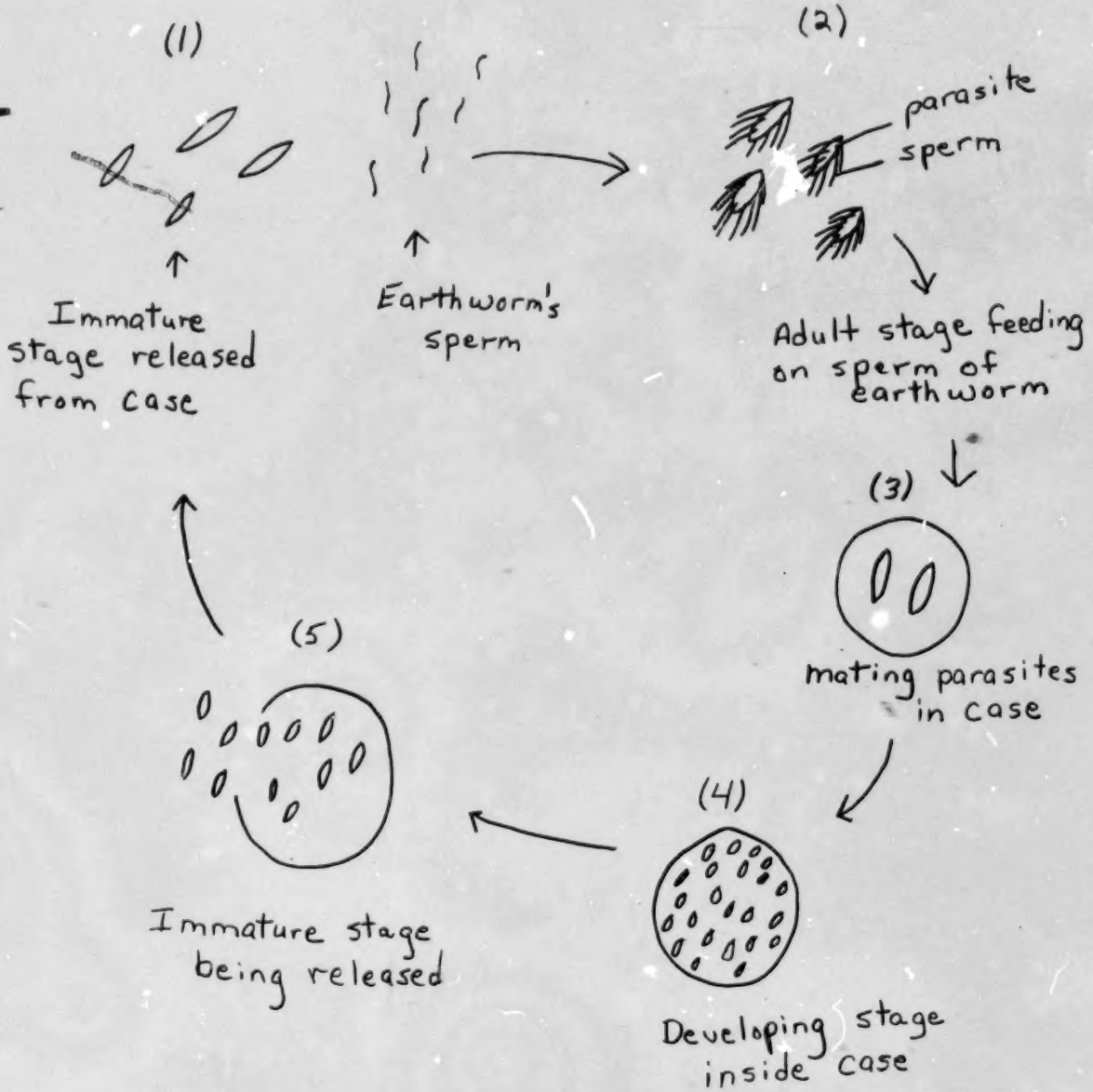
3. Using a sharp-pointed pair of scissors, make a cut into the earthworm near the end of the tail, and carefully cut just below the skin all the way to the head. As you cut, pin the earthworm open with the pins at an outward angle.

4. For the parasite in the earthworm's seminal vesicles:
   a. remove one of the bulb-shaped vesicles and place on a clean slide with a drop of water or 0.7% Ringer's Solution.

   b. chop up the vesicle by teasing apart with needle probes (dissecting pins), scapels, or razor blades.

   c. add a drop of methylene blue (don't overstain) and place coverslip over mount. Gently press coverslip with thumb and squash into a smear.

d. focus in on the material at low power (100x) and look for some of the following sketches representing various stages in the life cycle of the parasite; and then switch to high power. Sketch those stages seen as you see them under the microscope, not as seen here.



5. For the parasite in the earthworm's kidney (nephridium):
   a. cover the dissected earthworm with just enough unchorinated water to cause the internal organs to float.

   b. with a pair of tweezers (forceps) pick and pull around where the nephridia are located. Doing this with the aid of a binocular microscope may be useful. Keep picking and pulling until you get a small, stringy thread on the forceps. This is most likely the earthworm's kidney.

   c. place this white thread on a slide containing a drop of unchlorinated water or 0.7% Ringer's Solution, and add a cover slip. With your thumb, gently squash down the mount.

   d. focus in on low power (100x) and move the slide around. If the tissue being observed is kidney material, you will most likely find a squirming, snake-like roundworm. Focus in on high power for a closer look. Make a sketch of what you see.

QUESTIONS:

1. What is the definition of each of the following:
   a. parasite

   b. host

2. What damage may be caused by the protozoan living in the earthworm's seminal vesicle?

3. What damage may be caused by the roundworm living in the earthworm's kidney?

4. a. The earthworm is a cold-blooded animal. Do you think that either one of these parasites could live in the human body?

   b. Explain your answer.

5. Look up how the earthworm reproduces and eats. How do you suppose other earthworms become infected with these parasites?

This mini-unit is recommended at the conclusion of the study and dissection of the earthworm. The students should then have enough skill in dissection and knowledge of the location of the organs. Every student should be successful in finding the parasite in the earthworm's seminal vesicles, but only the more skiliful, patient, or just lucky students will find the nematode. It is fairly difficult to come up with a tiny, thread-like nephridium. However, it is worth trying.

Earthworms can be gotten alive at almost any time of the year, including winter. If the students can't find any, most bait stores, like Fox's Bait and Tackle Store on South Market Street near Mt. Olivet Cemetery, or Delphey's Sports Store on West Patrick Street, should have a dozen. Both of these stores are in Frederick. If earthworms are in short supply, it is possible to manage with one or two earthworms by placing the dissected seminal vesicles in a Syracuse dish containing 0.7% Ringer's Solution, mince the vesicles thoroughly, and dispense to the students with an eye-dropper. However, this method is thining out the culture, and decreasing the chances of every student seeing parasites.

It is best to use Ringer's Solution to maintain the proper osmotic pressure in the tissue, but if the quantity of this solution is limited, ordinary tap water, unchlorinated, has proven successful. Methylene blue is recommended for viewing the protozoan parasite in the seminal vesicle, since it makes the parasite stages stand out. However, caution against over-staining which reduces light transmission.

Also, occasionally, the earthworm's sperm stays alive long enough to see them swimming if stain is not used immediately. In the case of the nematode, the round-worm will be more attracting to the eye if no methylene blue is used because of the killing effect of the alcohol in the stain which will still the wiggling.

Most likely the microscope study can be done in one day if you have some of the students who find the nematode share their results. The parasite of the seminal vesicle will surely be found by the majority of the class in one period.

Materials:

- living earthworm
- 0.7% Ringer's Solution (99.3 g. of H_2O + 0.7 g of NaCl)
- 5% alcohol (95 ml of H_2O + 5 ml of alcohol)
- methylene blue
- dissecting pins
- dissecting pan
- sharp-pointed scissors
- needle probes
- monocular and binocular microscopes
- slides
- coverslips

Textbooks and References:

Any text showing a good, illustrated sketch of the earthworm is satisfactory. Here are several that specifically point out the seminal vesicles and the nephridia.

The World of Living Things
Paul F. Brandwein, et al
Harcourt, Brace Jovanovich, Inc.
1964
page 134

Life: Its Forms and Changes
Paul F. Brandwein
Harcourt, Brace Jovanovich, Inc.
1968
page 346

Modern Biology
Otto, Towle
Holt, Rinehart & Winston, Inc.
1969
page 410

A Sourcebook for the Biological Sciences
Morholt, et al
Harcourt, Brace Jovanovich, Inc.
1958
Anatomy of the earthworm, page 271
Parasite in seminal vesicle, page 310
Solutions, page 403

The Earth: Its Living Things
Paul F. Brandwein, et al
Harcourt, Brace Jovanovich, Inc.
1970
page 170

Evaluation Form for Teachers

1. Name of the mini course _____

2. Was this unit appropriate to the level of your students?

3. Explain how this mini course was used with your students. (Individual, small group, or total class)

4. Identify the plus factors for this course.

5. List the changes that you would recommend for improvement.

7. Did you use any other valuable resources in teaching this unit? If so, please list.

PLEASE RETURN TO SCIENCE SUPERVISOR'S OFFICE AS SOON AS YOU COMPLETE THE COURSE.

ADDITIONAL SCIENCE MINI-COURSES

LIFE SCIENCE	Prepared by
A Study for the Birds	Terrence Best
Creepy Critters (Snakes)	Terrence Best
How's Your Plumbing?	Paul Cook
Guess Who's Been Here for Dinner	Paul Cook
Plants - The "Other" Living Things	Sharon Sheffield
Let's Look at You - The Human Organism	Sharon Sheffield
Classification: Why is There a Need?	Melvin Whitfield
Protist: The "Unseen" Kingdom	Melvin Whitfield

EARTH SCIENCE	
Coastline Development	Nelson Ford
Ocean Currents	John Fradiska
Features of the Ocean Floor (Ocean Floor Topography)	John Fradiska
Space and Its Problems	John Geist
Invertebrate Fossils: Clues to the Distant Past	John Geist
An Attempt towards Independent Study in Astronomy	John Geist

PHYSICAL SCIENCE	
Household Chemistry	Ross Foltz
Notions on Motions	Kenneth Howard
Environmental Chemistry	Fred Meyers